8. Magdalena

Program Name: Magdalena.java **Input File: magdalena.dat**

In Magdalena's mathematics class, they sometimes work with large bases. To handle numbers in such bases, the class has agreed on the following convention: the first ten digits are the Arabic numerals, (0, 1, ... 9), the next twenty-six digits are the upper-case Latin alphabet (A, B, C, ..., Z), and the next twenty-six digits, are the lowercase Latin alphabet (a, b, c, ..., z). With this schema, the students in the class can work in any base from 2 to 62 (both ends inclusive).

For example, Magdalena can convert 314159265 in base 10 to 1B8XeX in base 48. To prove this to herself, she double checks that:

$$314159265 = 1 * 48^5 + 11 * 48^4 + 8 * 48^3 + 33 * 48^2 + 40 * 48^1 + 33 * 48^0$$

Magdalena feels comfortable with doing large base conversions and is now considering new challenges. She likes large numbers, and she also likes numbers with large digit sums.

The digit sum of a number X in base B can be computed the following way: write out the digits of X in base B, sum those digits, and output the result in base B. For example, the digit sum of 314159265 in base 10 is 36. The digit sum of 1B8XeX in base 48 is 2U (126 in base 10).

Now Magdalena wonders: given a large number X in some base B, what is the largest digit sum over all numbers Y <= X in base B?

Input: The first line of input is an integer T (1 <= T <= 50), the number of test cases. Each test case has two space-separated tokens. The first token is B (2 <= B <= 62), an integer written in base 10 representing the base of X. The second token is positive integer X, written in base B. X will have no more than 200 digits in whatever base it is written in and has no leading 0s. X will be a valid integer in base B.

Output: For each test case, output a single integer: the largest possible digit sum of any integer <= X, expressed in base B. Format the output as in the samples.

Sample Description: The digit sum of a single digit number is that digit itself. Therefore the largest digit sum of numbers <= 5 is 5.

Sample input:

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3
10 5
16 10
48 1B8XeX
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Sample output:

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Case #1: 5
Case #2: F
Case #3: 4h
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